

## **Flash Flood Forecasting as an Element of Multi Hazard Warning Systems**

**Mr. Wolfgang Grabs, Chief, Water Resources Division, WMO**

### **Abstract**

Weather-, water- and climate-related hazards account for 90% of loss of life from disasters. Enormous investments have been made in the past in observational systems that generate the data, which is essential for feeding models to provide accurate forecasting, and communication systems that allow the near real-time dissemination of data and forecasting information.

Traditionally however, the forecasting and warning services provided by government agencies had been largely based on single hazard system approaches. This resulted in a multitude of forecasting and warning systems that often lack interoperability and quite often, basic infrastructure and reporting systems had been duplicated.

It is unacceptable that lives, infrastructure and property are lost at a time when the relevant technologies, expertise and capacities are largely available to prevent flash floods, storm surges and other hydrometeorological hazards from turning into major natural disasters. The challenge is to ensure that these capabilities are improved and that all countries particularly those with least resources can adopt them to safeguard their populations and their economy. To this end, the development of a culture of prevention and pre-disaster strategies in risk assessment, and establishing the legal, technical and institutional mechanisms to provide effective early warnings need to be an integral part of international, national, regional and local policies and disaster preparedness plans.

Many current practices in flood forecasting show that early warning and forecasting of flash floods had been treated mostly as separate hazard based on different triggering mechanisms and also, because the complexity and difficulties involved in the forecasting of flash floods had been a challenging task in terms of scientific understanding, forecasting capabilities and the establishment of warning systems. Recently, it is being widely acknowledged that flash flood forecasting needs to be positioned within the framework of an integrated flood forecasting and management framework. Foremost, this requires the enhanced cooperation between national meteorological and hydrological services and those organizations that are responsible to generate meaningful information for the potentially affected population down to household level. There is however an encompassing concept that allows the integration of vital observational and communication systems to ensure timely and accurate forecasts and that generates budget-effective synergies in dealing with a multitude of disasters.

This is being increasingly realized in the development and operation of multi-hazard warning systems, like those that are being established to forecast Tsunamis as well as storm surges and thus can be integrated in coastal flood management plans.

Overall benefits of Multi-Hazard, Multi-Purpose Early Warning Systems include the realization of synergies from joint organizational, technical, operational and communication systems and mechanisms, more effective integrated warning information and services, including improved decision making through enhanced integration of hydro-meteorological warnings. Further benefits include a better cost-effectiveness and sustainability of early warning systems as a result of a more frequent use of the system and maintenance from different budgetary resources that also allow continuous improvements of the system in terms of observations, forecasting and communication to users.